Hall, Town, the 31st day of August, 1840, for the purpose of hearing appeals against the first assessments (48 Geo. 3, c. 55, sch. A.):—Mr. Robert Edwards, of Aberdovey, draper and grocer, appealed and claimed exemption for one window in a room in his dwelling-house in which drapery goods are kept and exposed for sale. The appellant stated that the shop forms a part of his dwelling-house in front, and on the ground floor thereof; that there are two windows in the same, which were allowed and not brought into charge; that the first section of 4 Geo. 4, c. 11, grants exemption for three windows in any shop or warehouse, being parts of a dwelling-house: he therefore claimed exemption for one other window which is in a room on the first floor immediately over the shop, wherein drapery goods are exposed to sale. The commissioners present deeming the exemption provided by the said Act to extend to and embrace this case, allowed the appeals; but the surveyor submitted that in order to entitle the party to exemption for the said window, it is necessary that the room should be on the ground or basement story, which it appears is not the case in this instance, therefore not exempt from duty, and demanded that the case be stated for the opinion of her Majesty's judges.

GRIFFITH EVANS, EDWARD C. OWEN, } Commissioners.

We are of opinion that the determination of the commissioners is wrong.

J. PATTESON. J. GURNEY. T. COLTMAN.
—*Justice of the Peace.*

Correspondence.

MEASURING ROUND TIMBER.

SIR,—I was somewhat surprised to perceive in your last number a correspondent, signing himself "J. M.," calling the attention of your readers to a "blunder of his townsman," in reference to a letter of mine some weeks ago, descriptive of the true method of measuring round timber, and which was written in answer to an inquiry in your last volume into the cause of a discrepancy between two methods of doing it. He calls my attention back to the first part of mathematics, presents us with a very popular but very erroneous method of solution, with his bare assertion that the result is the contest, calls it a demonstration, and trusts it will prevent many "committing such gross mistakes."

Permit me respectfully to assure him that I have made no blunder whatever. The blundering (I regret to say) is entirely with himself; and one of the gross mistakes of which he warns others, he has most egregiously committed himself. He has, in fact, fallen into the chief of those errors out of which I endeavoured to rescue your former correspondent, and which endeavour he might have rendered instrumental to his own enlightenment, had he given it the requisite consideration, and a moderate portion of his attention to that part of mathematics to which he calls mine.

He has escaped the error of dividing by 4 for the girth, which brings him something nearer to the truth than your correspondent "L," but the error of measuring in the centre (which in a piece so conical is a monstrous one) he has retained; which keeps him wide of the mark in his result nearly 159 feet.

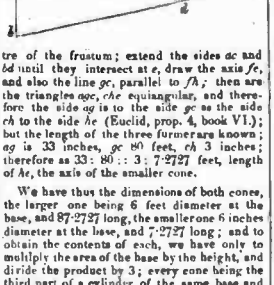
He directs us to lay down a triangle (he means a *trapezoid*) according to the rules of geometry, and says we can, with precision, find the mean diameter by measuring at 40 feet from the end, that is to say, in the centre. I admit that we can do so, but it is evident, and well known to all mathematicians, that the area of the circle to which that diameter refers is not the *mean* area, simply because "triangulation," or the methods of superficial mensuration, "will not apply to cube measure." The mean diameter is an *arithmetical* mean between the *diameters* of the extremes, whereas the thing wanted is a *geometrical* mean between the *areas* of the extremes. It is this I have sought, and by it obtained the true mean or average area, in the method I laid down, and which is applied below, viz.:

$6^2 + 7{\cdot}2^2 + (7{\cdot}2 \times 6) \times {\cdot}2618 = 1479{\cdot}6936$, mean area in inches; or $10{\cdot}2765$ feet $\times 80 = 822{\cdot}052$ feet, contents of the piece,

Or

$(6^2 \times {\cdot}7854) + (7{\cdot}2^2 \times {\cdot}7854) + \sqrt{(6^2 \times {\cdot}7854) \times (7{\cdot}2^2 \times {\cdot}7854)} = 4439{\cdot}0808$. Then, $4439{\cdot}0808 \div 3 = 1479{\cdot}6936$, mean area in inches, agreeing exactly with the result of the former [illegible]

There is another way which might be advantageously pursued in the mensuration of such solids, and by which a proof more obvious to many of the truth of the former ones, will be obtained. It is to compute the contents of the cone of which the given solid is a frustum, and deduct the contents of the smaller cone by which that cone exceeds the frustum. The length of the smaller cone, and consequently of the larger one, may be found in the manner following, viz.:—Let *ab*, *dc* be the section through the axis or centre of the frustum; extend the sides *ac* and *bd* until they intersect at *e*, draw the axis *fe*, and also the line *gc*, parallel to *fA*; then are the triangles *age*, *che* equiangular, and therefore the side *ag* is to the side *gc* as the side *ch* to the side *he* (Euclid, prop. 4, book VI.); but the length of the three former are known; *ag* is 33 inches, *gc* 80 feet, *ch* 3 inches; therefore as 33 : 80 :: 3 : 7·2727 feet, length of *he*, the axis of the smaller cone.



We have thus the dimensions of both cones, the larger one being 6 feet diameter at the base, and 87·2727 long, the smaller one 6 inches diameter at the base, and 7·2727 long; and to obtain the contents of each, we have only to multiply the area of the base by the height, and divide the product by 3; every cone being the third part of a cylinder of the same base and altitude. (Euclid, prop. 10, book XII.)

Thus for the first cone—

$6 \times 6 \times {\cdot}7854 = 28{\cdot}2744$ feet, area of the base; and $(28{\cdot}2744 \times 80) \div 3 = 822{\cdot}5277296$ feet, contents.

For the second cone—

$6 \times 6 \times {\cdot}7854 = 28{\cdot}2744$ inches, or ·19635 feet, area of the base; and $(\cdot19635 \times 7{\cdot}2727) \div 3 = {\cdot}475998215$, contents; leaving $822{\cdot}051744745$ feet for the contents of the frustum.

This is a method distinct from the others, and yet it agrees with them in its result, within ·000256, or about $\frac{1}{4000}$ of a foot; and it would agree *exactly*, but for the necessary limiting of the places of decimals.

If I am correct, Sir, in these statements (and that I am, no mathematician will deny), you will admit that the error I have endeavoured to refute is a most egregious one, and to the interest of the merchant charging his timber under its influence, a most fatal one. Supposing the price 1s. per foot, he would, in the piece in question, lose 7*l.* 19s.; and, of course, double and quadruple that sum in the same quantity of the more costly kinds. I should be obliged by the insertion of this communication in your next excellent paper, and remain, Sir, yours very respectfully,

S. HUGGINS.

Liverpool, February 6th, 1844.

SIR,—As a reader of THE BUILDER, your correspondent "J. M." has called my attention to a blunder committed by his townsman in finding the contents of round timber, and has not answered the question proposed, *i. e.* why the three parts measured separately amount to more, by the same method of measurement, than the tree when measured in one; but has merely cautioned me and many others not to commit such gross mistakes, by committing a greater one himself. Had "J. M." worked his proposition rightly, he would have found the method used by him produces the same results; for I find the contents of his two parts taken separately to be 672·007 feet and 110·446 feet, which exceeds the whole, viz. 663·663 feet by 119·791 feet. The discrepancy arises from the area of the section in the middle not representing the mean area throughout the whole length. Your correspondent "L." has measured the tree by the customary quarter-girth method, *i. e.* as a square prism, whose side is the quarter-girth in the middle of the length; by comparing the two following formulæ, he will see the section in the centre does not represent the mean area [illegible]

length, C the greater quarter circumference, and c the less, then $\frac{C+c}{2}$ will be the centre quarter circumference, and $\frac{C^2 + cC + c^2}{3} \times l$, the solidity of the frustum of a square pyramid, and $\frac{C^2 + 2Cc + c^2}{4} \times l$, the solidity, by customary method: by using the first of these, the tree might have been cut into any number of lengths, and their solidities added together would have been the exact contents of the whole. Your correspondent "J. M." takes the tree as a cylinder whose diameter is the diameter of the section in the middle of the length of the tree, which section does not represent the mean area throughout. Let *l* be the length as before, C and c the circumference of the two ends, then $\frac{C^2 + Cc + c^2}{37{\cdot}6992} \times l$, the solidity of the tree as a frustum of a cone, and $\frac{C^2 + 2Cc + c^2}{50{\cdot}2655} \times l$, the solidity of the tree as a cylinder.

I am, Sir, yours, &c.,

Newman-street, Feb. 9, 1844. R. F. P.

N.B. If you think the above remarks worthy a place in your journal, you will oblige by inserting them, and, perhaps, some of your correspondents will oblige by letting me know where I may cut a tapered plank (whose length is *l*, and breadth of the two ends B and C) parallel to its ends, so that the two parts may contain each the same area.

STUDY OF EUCLID.

SIR,—Having often heard the advantages of a knowledge of Euclid insisted upon, I have for some weeks past given a part of my time to the study of it. I have thus advanced some short way without, I fear, reaping all the advantages which I might had I studied with any definite object in view besides the mere mastering of the propositions, that is, had I known what were the *practical* advantages of the study, and something of its *application* to the profession which I am learning. If, then, Sir, either you or any of your correspondents will be kind enough to give me a little enlightenment upon these heads, they will confer a favour on

Your obedient servant,

F. L. P.

P.S.—I am well aware of its use in expanding the reasoning and calculating powers of the mind; I merely wish to know how the problems are applied in practice in architecture and engineering.

[Proceed, and the knowledge thence resulting will bring the right answer.—ED.]

WESTMINSTER BRIDGE.

SIR,—In reply to a letter signed "B." in your useful periodical No. 52, with all due respect to the *great* or *bouncing* B, under which initial I am convinced I do not address the great Barry, the scientific Burgess, the elaborate Basivi, the mechanical Brunel, or the indefatigable *practical practitioner* Bartholomew, the skilful Braithwaite, or, in fact, any of the eminent B's of the profession,—I beg merely to state, that I am only "*an assistant's assistant*" *to those who require aid*; with this view, I beg to refer that gentleman to the original article which drew forth my remark, in your 50th number, signed "A Practical Observer." By offering this *assistance* to "B.'s" memory, he will perceive no alteration or embellishment is proposed, until the piers were effectively constructed, or, to use his own words, "been underpinned (despite of the caisson), progressively, to the whole depth required, so as to obtain a sound and substantial foundation on such a stratum as might be relied upon for *carrying the most massive erection*." By this reference, the great "B." will perceive that it was not by the "Practical Observer" intended as "B." states, "that a pier incapable of supporting an arch of 70 feet span, with its superincumbent weight, would be equal to the support of one of 140 feet span, as proposed;" nor can I believe it to be "*in Messrs. Walker and Burgess's wake*," that It would be necessary to suggest, as "B." states, "it is manifest that instead of throwing two arches into one," &c., *and of course doubling the pressure* (if not of lighter construction), that "the correct system of procedure would be to increase their number, and reduce the span of the arches, [illegible] narrow as they are." The